

CLAIMS

What is claimed is:

1. A method of fabricating a dry electro-active polymeric synthetic muscle, the method comprising the steps of :
  - a) providing a polyelectrolyte material;
  - b) mixing the polyelectrolyte material with a conductive material; and
  - c) affixing at least two electrodes to the mixed polyelectrolyte material and conductive material.
- 10 2. The method of claim 1 wherein the step of mixing comprises mixing a soluble polyelectrolyte material with an ion conducting powder and drying the mixed polyelectrolyte material with the conductive material.
- 15 3. The method of claim 1 wherein the step of mixing comprises combining a dry polyelectrolyte material with a dry conductive material and applying heat to the combined materials.
- 20 4. The method of claim 1 wherein the step of mixing comprises combining a dry polyelectrolyte material with a dry conductive material and applying pressure to the combined materials.
- 25 5. The method of claim 1 wherein the step of affixing at least two electrodes comprises penetrating the at least two electrodes into the mixed polyelectrolyte material and conductive material .

6. The method of claim 5 wherein the step of penetrating the at least two electrodes into the mixed polyelectrolyte material and conductive material comprises heating the penetrated at least two electrodes and the mixed polyelectrolyte material and conductive material.

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7. The method of claim 5 wherein the step of penetrating the at least two electrodes into the mixed polyelectrolyte material and conductive material comprises pressurizing the penetrated at least two electrodes and the mixed polyelectrolyte material and conductive material.

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8. The method of claim 1 wherein the step of affixing at least two electrodes comprises physical loading and interlocking primary electrically conducting particles with smaller electrically conducting particles within the polyelectrolyte material.

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9. The method of claim 1 wherein the polyelectrolyte material comprises a member from the group consisting of polyethylene oxide, polyethylene succinate, polypropiolactone, polyethylene adipate, polypropylene oxide, polymethacrylic acid, polyacrylonitrile, polybis-methoxyethoxyethoxy phosphazene and polyvinylidene fluoride.

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10. The method of claim 1 wherein the synthetic muscle comprises a sensing device.

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11. The method of claim 1 wherein the synthetic muscle comprises a transducing device.

12. The method of claim 1 wherein the synthetic muscle comprises an actuating device.

13. A dry electro-active polymeric synthetic muscle comprising:  
5 a polyelectrolyte material mixed with a conductive material;

and

at least two electrodes affixed to said mixed polyelectrolyte  
material and conductive material.

10 14. The invention of claim 13 wherein said at least two electrodes  
penetrate into the mixed polyelectrolyte material and conductive material.

15 15. The invention of claim 13 wherein said polyelectrolyte material  
comprises a member from the group consisting of polyethylene oxide,  
polyethylene succinate, polypropiolactone, polyethylene adipate, polypropylene  
oxide, polymethacrylic acid, polyacrylonitrile, polybis-methoxyethoxyethoxy  
phosphazene and polyvinylidene fluoride.

20 17. The invention of claim 13 wherein said at least two electrodes  
comprise a member from the group consisting of screen mesh, conducting  
polymers, carbon-nanotubes, porous materials, metals, metal alloys and  
conducting powders.

25 18. The invention of claim 13 wherein the synthetic muscle comprises a  
sensor.

19. The invention of claim 13 wherein the synthetic muscle comprises a  
transducer.

20. The invention of claim 13 wherein the synthetic muscle comprises an actuator.